
Ultra-Low ON-Resistance, Low Voltage, SPDT Analog Switch

FEATURES

- **-3dB Bandwidth: 30MHz**
- **High Speed: Typically 50ns**
- **Supply Range: +1.8V to +5.5V**
- **Low ON-State Resistance: 0.6Ω(TYP)**
- **Break-Before-Make Switching**
- **Rail-to-Rail Operation**
- **TTL/CMOS Compatible**
- **Extended Industrial Temperature Range: -40°C to +125°C**
- **Micro SIZE PACKAGES: SC70-6, SOT23-6**

APPLICATIONS

- **Wearable Devices**
- **Battery-Operated Equipment**
- **Signal Gating, Chopping, Modulation or Demodulation (Modem)**
- **Portable Computing**
- **Cell Phones**

DESCRIPTION

The RS2257 is a single-pole double-throw (SPDT) analog switch that is designed to operate from 1.8 V to 5.5 V.

The RS2257 device can handle both analog and digital signals. It features fast switching speeds (50ns) and low on-resistance (0.6Ω TYP).

Applications include signal gating, chopping, modulation or demodulation (modem), and signal multiplexing for analog-to-digital and digital-to-analog conversion systems.

Device Information (1)

PART NUMBER	PACKAGE	BODY SIZE (NOM)
RS2257	SC70-6	2.10mm×1.25mm
	SOT23-6	2.92mm×1.60mm

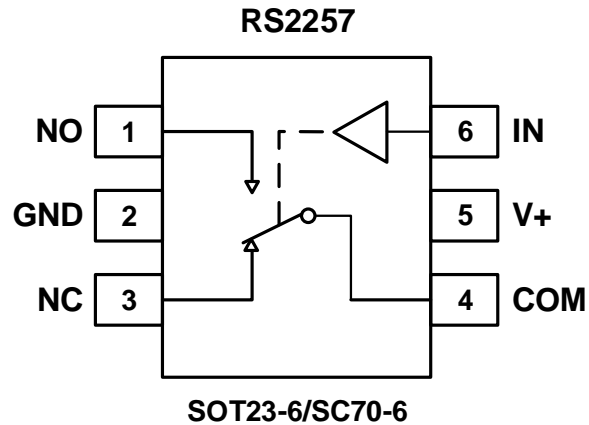
(1) For all available packages, see the orderable addendum at the end of the data sheet.

Revision History

Note: Page numbers for previous revisions may differ from page numbers in the current version.

VERSION	Change Date	Change Item
C.3.1	2024/03/07	<ol style="list-style-type: none">1. Added the TAPE AND REEL INFORMATION2. Update PACKAGE MARKING on Page 3@RevC.33. Change Thermal Information on Page 2@RevC.34. Modify packaging naming

Pin Configurations



PIN DESCRIPTION

PIN	NAME	FUNCTION
	SOT23-6/SC70-6	
1	NO	Normally-Open Terminal
2	GND	Ground
3	NC	Normally-Closed Terminal
4	COM	Common Terminal
5	V+	Power Supply
6	IN	Digital Control Pin

FUNCTION TABLE

LOGIC	NO	NC
0	OFF	ON
1	ON	OFF

SPECIFICATIONS

Absolute Maximum Ratings

Over operating free-air temperature range (unless otherwise noted) ⁽¹⁾

SYMBOL	PARAMETER	MIN	MAX	UNIT
V ₊	Supply Voltage	-0.3	6	V
V _{IN}	Input Voltage (All inputs)	-0.3	(V ₊)+0.3	
I _{IN}	Continuous Current NO, NC, or COM	-500	+500	mA
I _{PEAK}	Peak Current NO, NC, or COM	-800	+800	
T _J	Junction Temperature	-40	150	°C
T _{stg}	Storage temperature	-65	+150	

(1) Stresses above these ratings may cause permanent damage. Exposure to absolute maximum conditions for extended periods may degrade device reliability. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those specified is not implied.

ESD Ratings

			VALUE	UNIT
V _(ESD)	Electrostatic discharge	Human-body model (HBM)	±1000	V
		Machine Model (MM)	±100	

Recommended Operating Conditions

Over operating free-air temperature range (unless otherwise noted)

SYMBOL	PARAMETER	MIN	MAX	UNIT
V _{CC}	Supply Voltage	1.8	5.5	V
T _A	Operating temperature	-40	+125	°C

Thermal Information

THERMAL METRIC		RS2257		UNIT
		6 PINS		
		SOT23-6	SC70-6	
R _{θJA}	Junction-to-ambient thermal resistance	187.3	214.7	°C/W
R _{θJC(top)}	Junction-to-case(top) thermal resistance	126.5	127.1	°C/W
R _{θJB}	Junction-to-board thermal resistance	32.6	60.0	°C/W
Ψ _{JT}	Junction-to-top characterization parameter	24.1	33.4	°C/W
Ψ _{JB}	Junction-to-board characterization parameter	32.1	59.8	°C/W
R _{θJC(bot)}	Junction-to-case(bottom) thermal resistance	N/A	N/A	°C/W

PACKAGE/ORDERING INFORMATION

PRODUCT	ORDERING NUMBER	TEMPERATURE RANGE	PACKAGE LEAD	PACKAGE MARKING ⁽¹⁾	PACKAGE OPTION
RS2257	RS2257XC6	-40°C ~125°C	SC70-6 ⁽²⁾	2257	Tape and Reel,3000
	RS2257XH	-40°C ~125°C	SOT23-6	2257	Tape and Reel,3000

NOTE:

- (1) There may be additional marking, which relates to the lot trace code information (data code and vendor code), the logo or the environmental category on the device.
- (2) Equivalent to SOT363.

ELECTRICAL CHARACTERISTICS

$V_+ = 5.0\text{ V}$, $T_A = -40^\circ\text{C}$ to 125°C (unless otherwise noted)

PARAMETER	SYMBOL	CONDITIONS	V_+	T_A	MIN	TYP	MAX	UNIT
ANALOG SWITCH								
Analog Signal Range	V_{NO}, V_{NC}, V_{COM}			FULL	0		V_+	V
On-Resistance	R_{ON}	$0 \leq (V_{NO} \text{ or } V_{NC}) \leq V_+$, $I_{COM} = -10\text{mA}$, Switch ON, See Figure 4	5V	+25°C		0.6	1.0	Ω
				FULL			1.2	Ω
			3.3V	+25°C		1.0	1.5	Ω
				FULL			1.7	Ω
On-Resistance Match Between Channels	ΔR_{ON}	$0 \leq (V_{NO} \text{ or } V_{NC}) \leq V_+$, $I_{COM} = -10\text{mA}$, Switch ON, See Figure 4	5V	+25°C		0.04	0.1	Ω
				FULL			0.12	Ω
			3.3V	+25°C		0.04	0.1	Ω
				FULL			0.12	Ω
On-Resistance Flatness	$R_{FLAT(ON)}$	$0 \leq (V_{NO} \text{ or } V_{NC}) \leq V_+$, $I_{COM} = -10\text{mA}$, Switch ON, See Figure 4	5V	+25°C		0.18	0.3	Ω
				FULL			0.4	Ω
			3.3V	+25°C		0.54	0.7	Ω
				FULL			0.8	Ω
NC,NO OFF Leakage Current	$I_{NC(OFF)}, I_{NO(OFF)}$	$V_{NO} \text{ or } V_{NC} = 0.3\text{V}$, $V_+/2$, $V_{COM} = V_+/2$, 0.3V See Figure 5	1.8 to 5.5V	FULL			1	μA
NC,NO,COM ON Leakage Current	$I_{NC(ON)}, I_{NO(ON)}, I_{COM(ON)}$	$V_{NO} \text{ or } V_{NC} = 0.3\text{V}$, Open $V_{COM} = \text{Open}$, 0.3V See Figure 6	1.8 to 5.5V	FULL			1	μA
DIGITAL CONTROL INPUTS⁽¹⁾								
Input High Voltage	V_{INH}		5V	FULL	1.5			V
			3.3V	FULL	1.3			V
Input Low Voltage	V_{INL}		5V	FULL			0.6	V
			3.3V	FULL			0.5	V
Input Leakage Current	I_{IN}	$V_{IN} = V_{IO} \text{ or } 0$	1.8 to 5.5V	FULL			1	μA

(1) All unused digital inputs of the device must be held at V_{IO} or GND to ensure proper device operation.

ELECTRICAL CHARACTERISTICS (continued)
 $V_+ = 5.0\text{ V}$, $T_A = -40^\circ\text{C}$ to 125°C (unless otherwise noted)

PARAMETER	SYMBOL	CONDITIONS	V ₊	T _A	MIN	TYP	MAX	UNIT
DYNAMIC CHARACTERISTICS								
Turn-On Time	t _{ON}	V _{COM} = V ₊ , R _L = 300Ω, C _L = 35pF, See Figure 8	5V	+25°C		50		ns
			3.3V			50		
Turn-Off Time	t _{OFF}	V _{COM} = V ₊ , R _L = 300Ω, C _L = 35pF, See Figure 8	5V	+25°C		15		ns
			3.3V			17		
Break-Before-Make Time Delay	t _{BBM}	V _{NO1} = V _{NC1} = V _{NO2} = V _{NC2} = 3V, R _L = 300Ω, C _L = 35pF, See Figure 9	5V	+25°C		10		ns
			3.3V			11		
Off Isolation	O _{ISO}	R _L = 50Ω, Switch OFF, See Figure 11	f = 100KHz	+25°C		-68		dB
			f = 10KHz	+25°C		-86		dB
-3dB Bandwidth	BW	Switch ON, R _L = 50Ω See Figure 10		+25°C		30		MHz
NC,NO OFF Capacitance	C _{NC(OFF)} , C _{NO(OFF)}	V _{NC} or V _{NO} =V ₊ /2 or GND, Switch OFF See Figure 7		+25°C		80		pF
NC,NO,COM ON Capacitance	C _{NC(ON)} , C _{NO(ON)} , C _{COM(ON)}	V _{NC} or V _{NO} =V ₊ /2 or GND, Switch ON See Figure 7		+25°C		350		pF
POWER REQUIREMENTS								
Power Supply Range	V ₊			FULL	1.8		5.5	V
Power Supply Current	I ₊	V _{IN} = GND or V ₊	5.5V	FULL			1	μA

TYPICAL CHARACTERISTICS

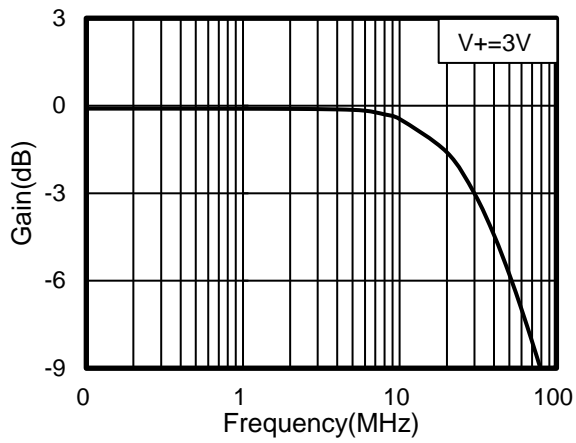


Figure 1. Bandwidth vs Frequency

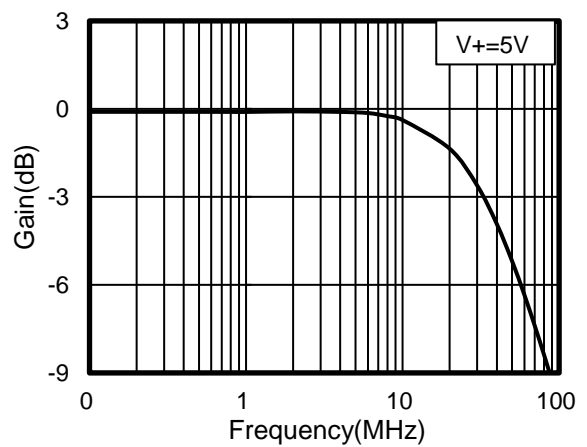


Figure 2. Bandwidth vs Frequency

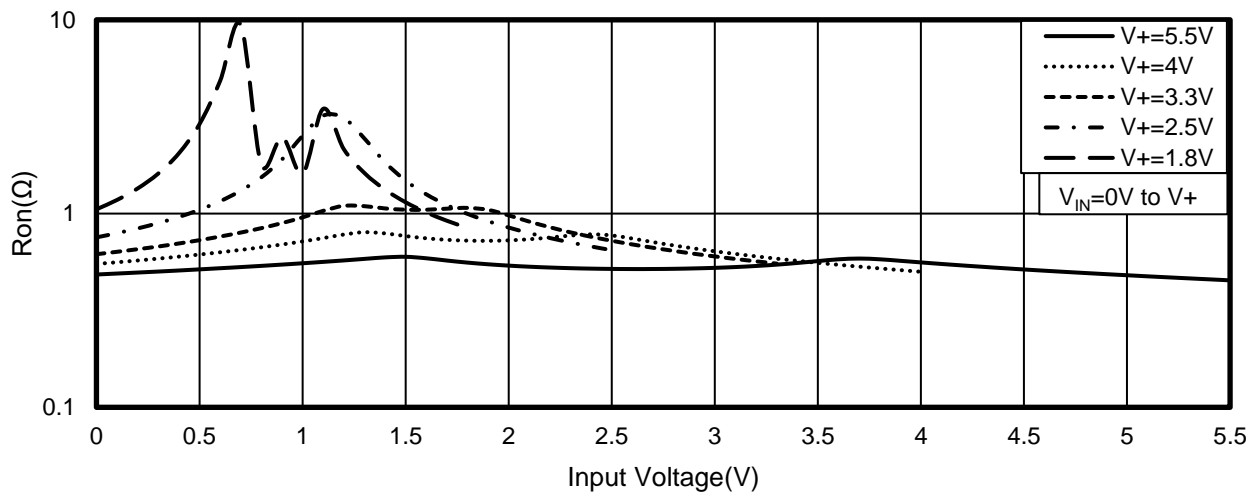


Figure 3. Typical Ron as a Function of Input Voltage

Parameter Measurement Information

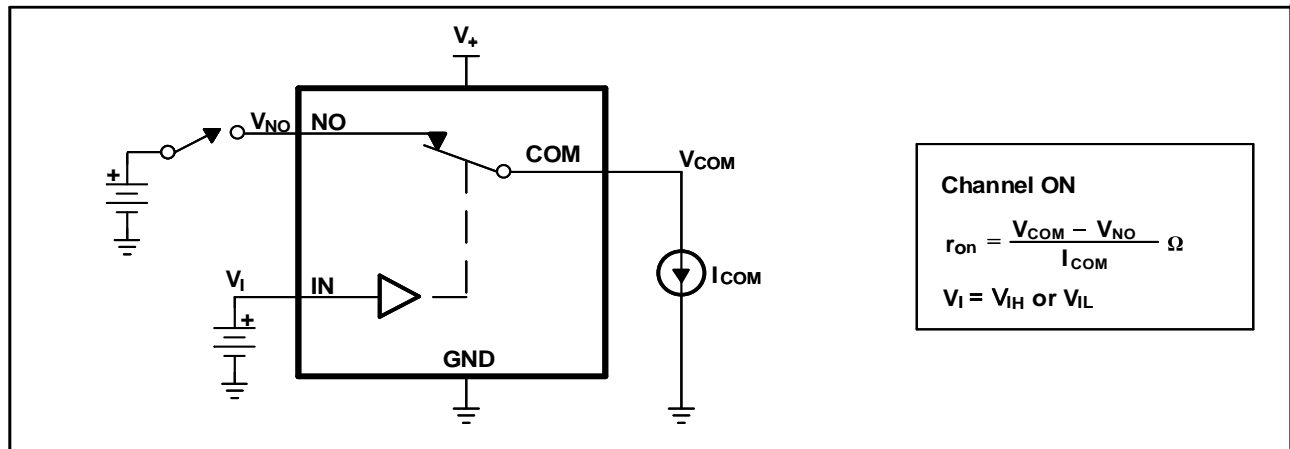


Figure 4. ON-State Resistance (R_{on})

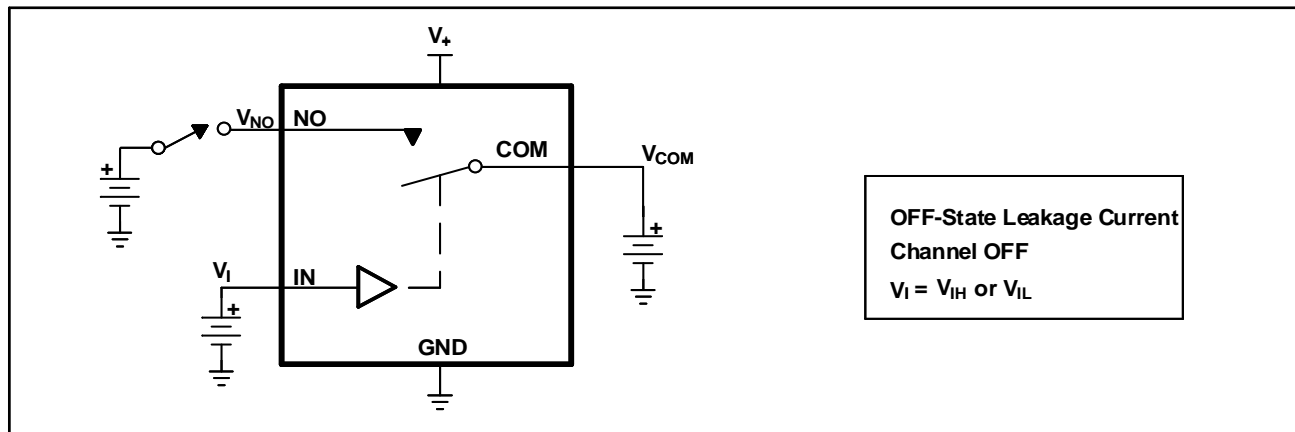


Figure 5. OFF-State Leakage Current ($I_{COM} (OFF)$, $I_{NO} (OFF)$)

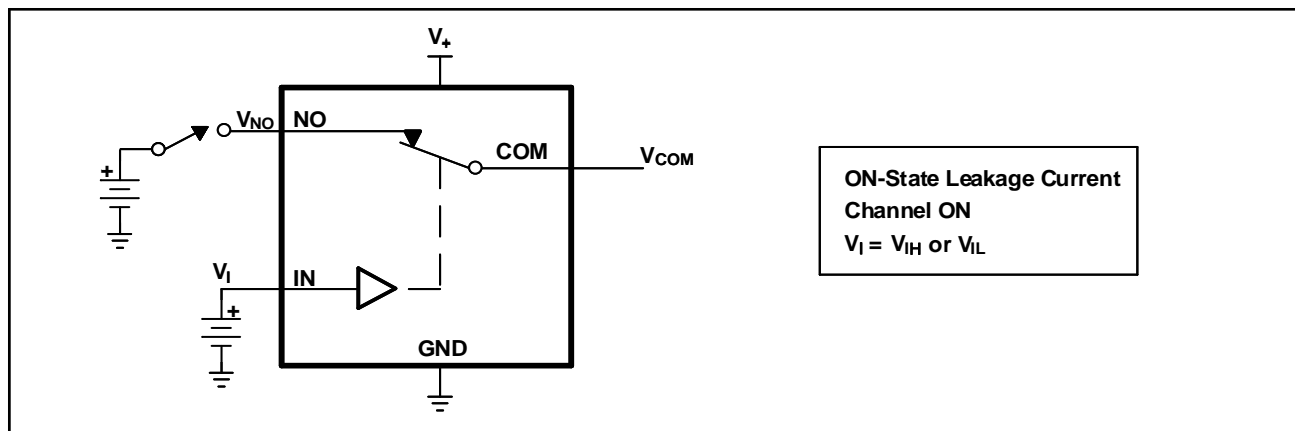


Figure 6. ON-State Leakage Current ($I_{COM} (ON)$, $I_{NO} (ON)$)

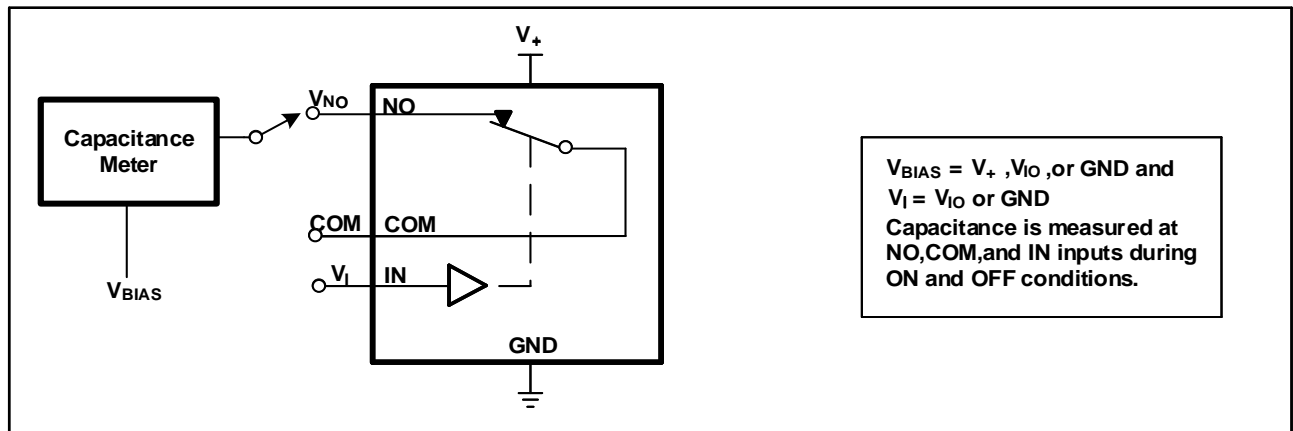


Figure 7. Capacitance (C_I , $C_{COM (OFF)}$, $C_{COM (ON)}$, $C_{NO (OFF)}$, $C_{NO (ON)}$)

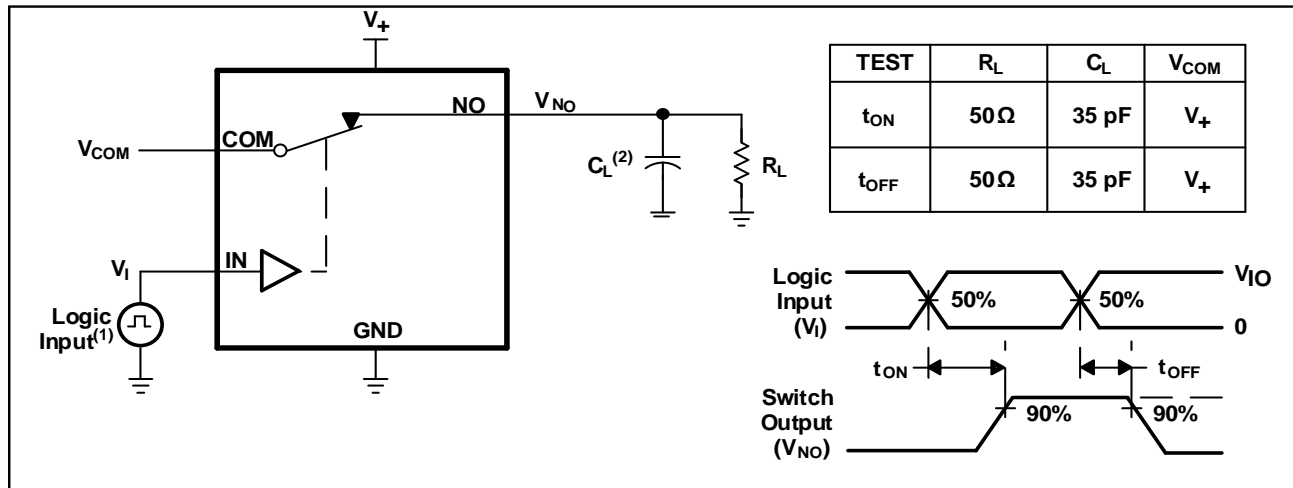


Figure 8. Turn-On (t_{ON}) and Turn-Off Time (t_{OFF})

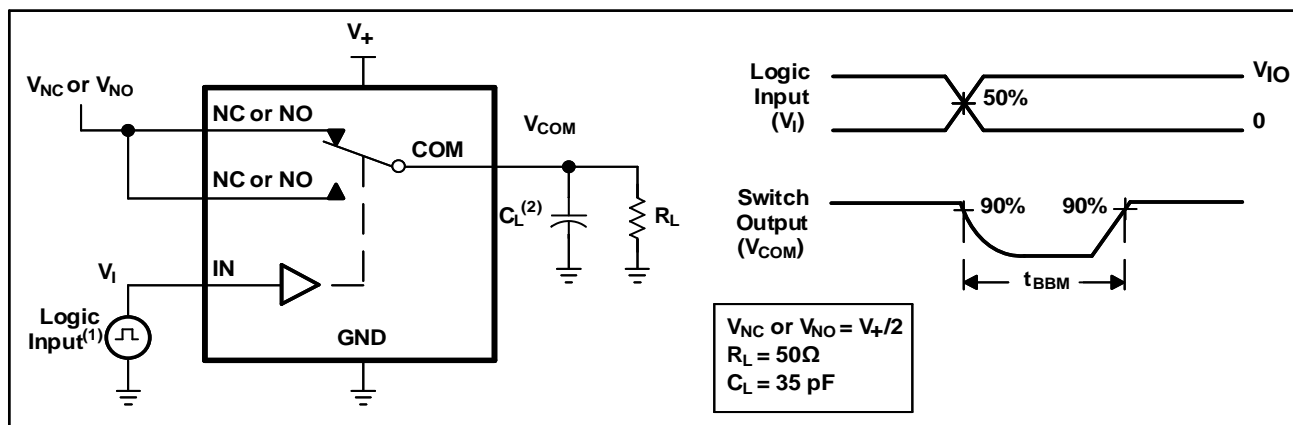


Figure 9. Break-Before-Make Time (t_{BBM})

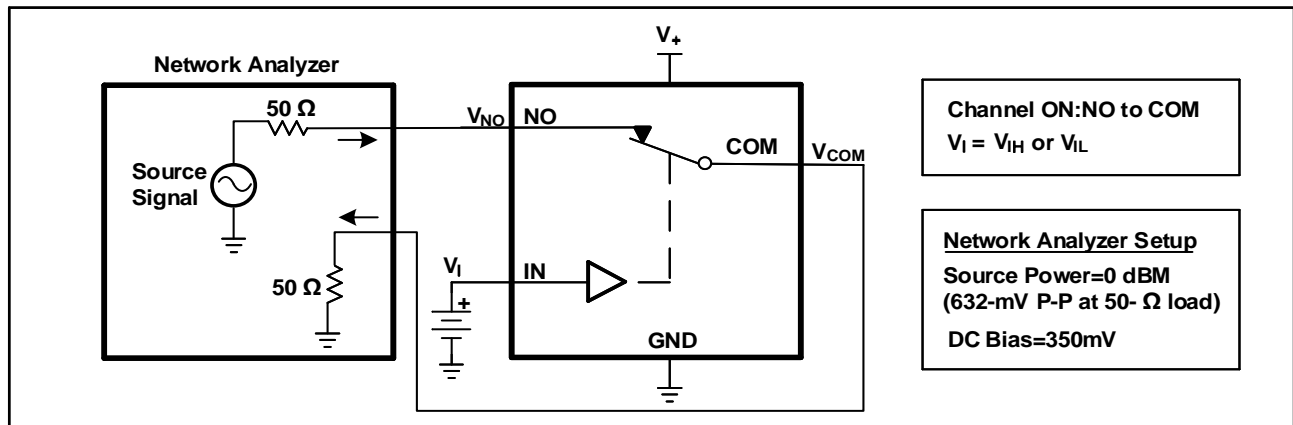


Figure 10. Bandwidth (BW)

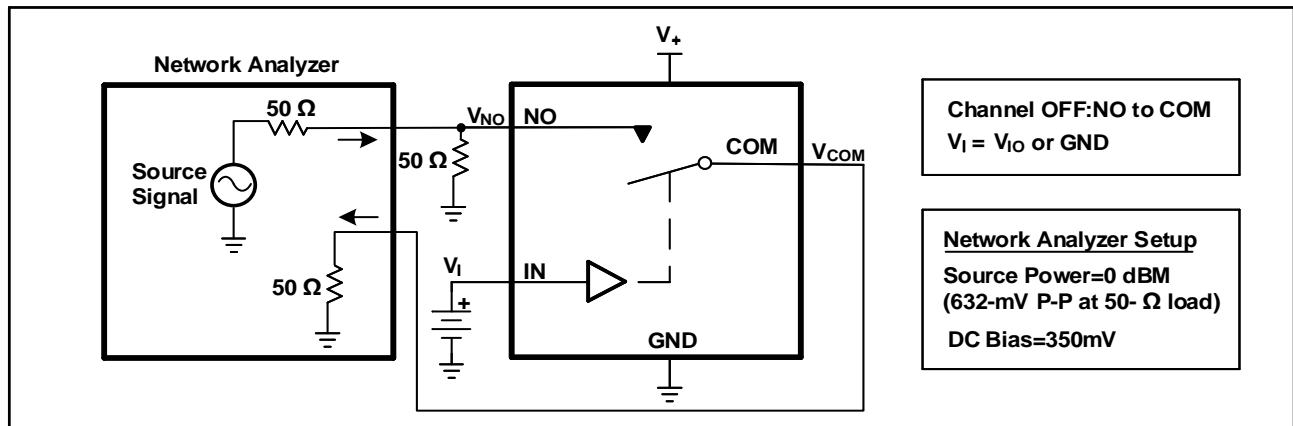


Figure 11. OFF Isolation (O_{Iso})

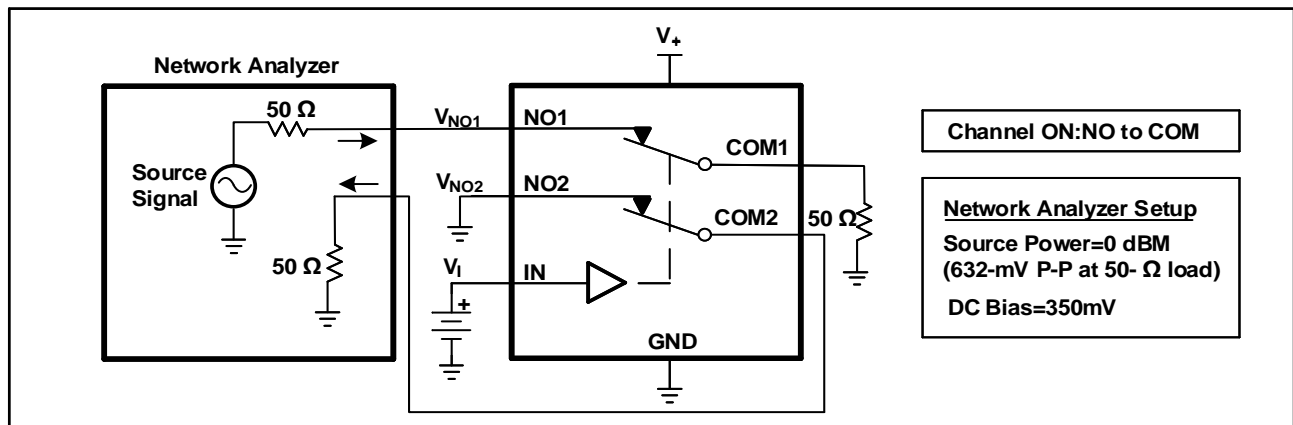


Figure 12. Crosstalk (X_{TALK})

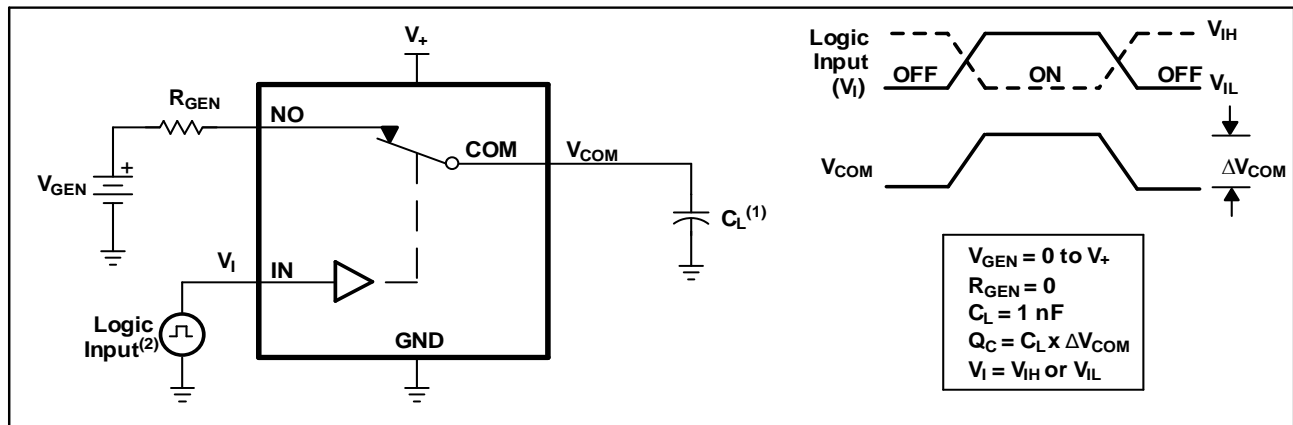
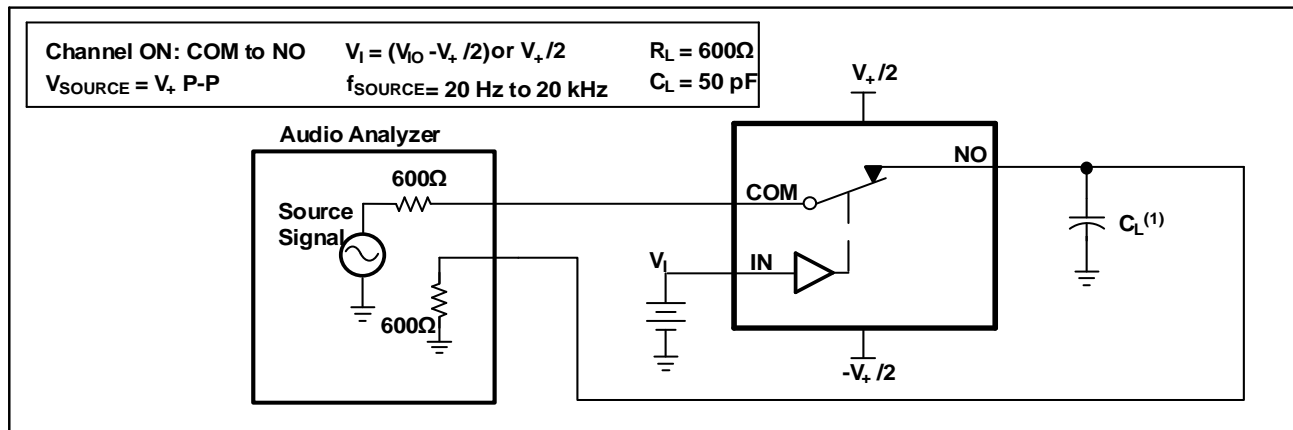
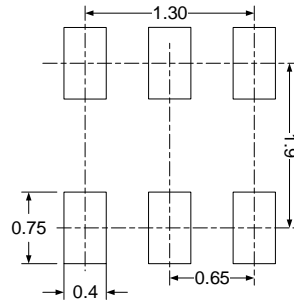
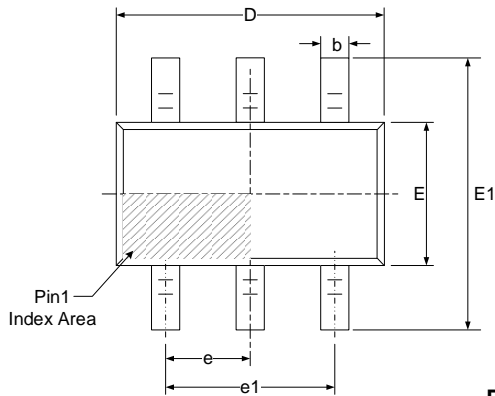
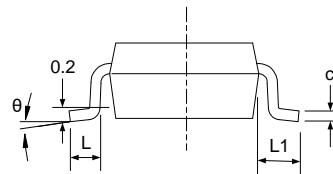
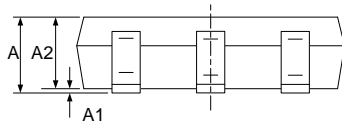

 Figure 13. Charge Injection (Q_C)


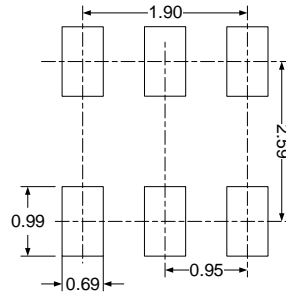
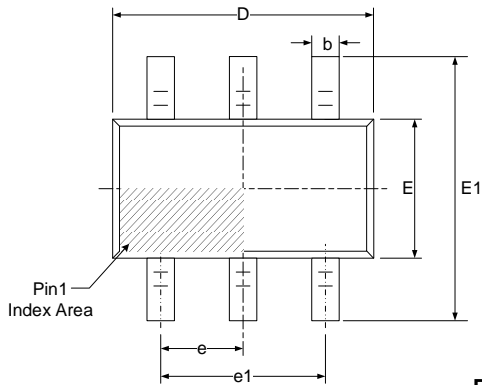
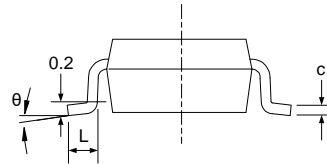
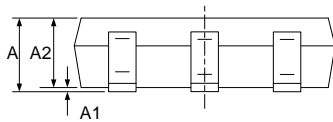
Figure 14. Total Harmonic Distortion (THD)

PACKAGE OUTLINE DIMENSIONS

SC70-6


RECOMMENDED LAND PATTERN (Unit: mm)


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650(BSC)		0.026(BSC)	
e1	1.300(BSC)		0.051(BSC)	
L	0.260	0.460	0.010	0.018
L1	0.525		0.021	
θ	0°	8°	0°	8°

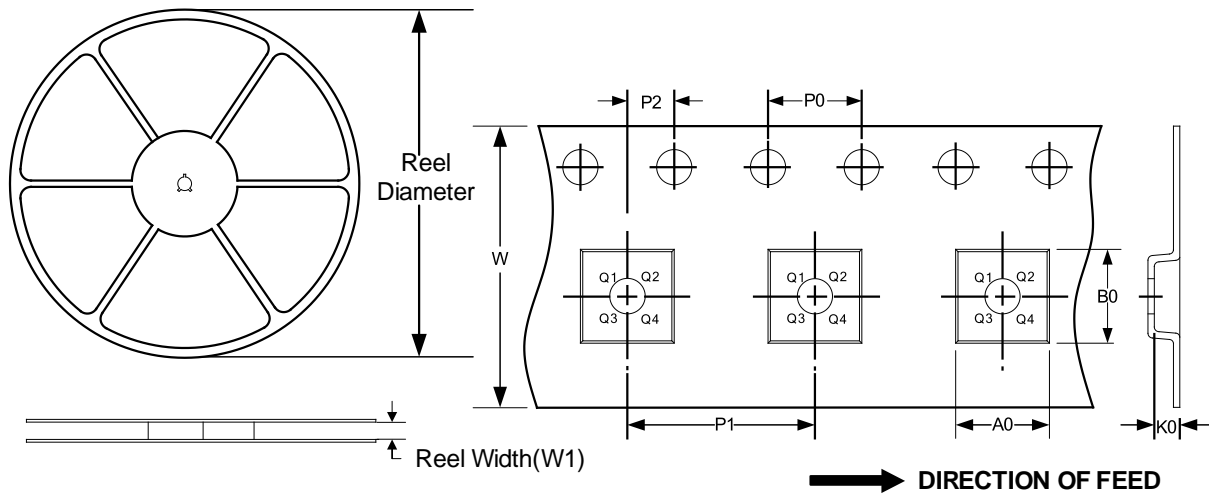
SOT23-6

RECOMMENDED LAND PATTERN (Unit: mm)


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

TAPE AND REEL INFORMATION

REEL DIMENSIONS

TAPE DIMENSION



NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width(mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SC70-6	7"	9.5	2.40	2.50	1.20	4.0	4.0	2.0	8.0	Q3
SOT23-6	7"	9.5	3.17	3.23	1.37	4.0	4.0	2.0	8.0	Q3